On the Forefront

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A Bright Outlook for 2004

Barring unforeseen events, 2004 is projected to be good year.

The year 2004 promises to be one for improved economic growth in the electronics industry. Foundries such as TSMC, UMC and Chartered are reporting high capacity utilization. Contract assembly operations report increases in capacity utilization and improved earnings. Driven by the latest craze over camera phones and new features, mobile phone production surpassed 450 million units in 2003 with a 10 to 15% growth rate projected for shipments in 2004.

Consumer electronics sales are expected to be strong for digital cameras and camcorders, MP3 players and DVDs. Digital camera sales passed 35 million units in 2003 and are projected to grow as much as 25% per year.[1] Demand for personal computers is increasing, and the server market is growing. With the growth of electronic content in cars, automotive electronics is a bright spot. According to Henderson Ventures, "global production of automotive electronics will grow by 11% in 2004."[2]

Recovery in Asia

After a decade of poor economic performance, Japan's economy seems to be on the rebound. Taiwanese companies are reporting improved business in the electronics sector. China continues to be an important growth area, reporting an 8.5% gross domestic product growth rate in 2003. China's production of laptops and mobile phones continues to grow, and manufacturing for domestic consumption and export markets is strong for these and other electronics products. Concerns about trade friction abound as China expands its own domestic electronics industry. Despite the entry into the World Trade Organization, China still places a 17% tariff on imports of foreign semiconductors in electronics sold in its domestic market.

Expansion of China's domestic semiconductor industry continues in both capacity and services. SMIC will offer wafer bumping this year, based on the transfer of equipment from Singapore's MicroFab. If all goes as planned, nine 8-in. semiconductor fab plants will be located in the Shanghai area this year.[3]

Advanced Packaging Drives Profits

Shipments of advanced packages—such as ball grid arrays (BGAs) and chip-scale packages (CSPs)—continue to drive the growth in revenue and margins for the integrated circuit (IC) package subcontract assembly operations. Data from Taiwan's Industrial Technology Research Institute shows that BGAs account for less than 8% of unit volumes; BGA sales account for more than 53% of revenue for Taiwanese companies.

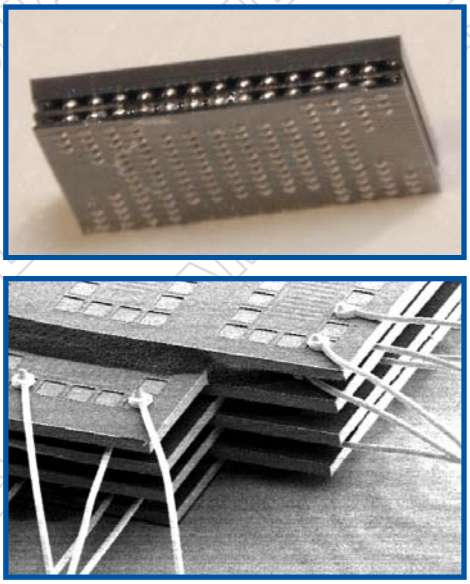

FIGURE 1: Fujitsu's eight die stacked CSP (top) and Intel's prototype eight-die stack with 50-μm die thickness (bottom).

Wafer bumping is expanding with strong demand for gold bumping driven by sales of driver ICs for flat panel displays and solder bumping driven by the move to flip chip and wafer-level packaging. Companies are expanding bumping capacity in Taiwan, Japan and China. In the U.S., the long awaited sale of the K&S Flip Chip Division to start-up RoseStreet Labs unleashes the new organization—now called FlipChip International—to tackle new markets. Almost all of the major contract assembly houses now offer wafer bumping and wafer-level packaging, including Amkor, ASE, ChipPac, Fujitsu Microelectronics, Shinko Electric, Siliconware (SPIL) and ST Assembly Test Services (STATS).

Stacked die packages continue to see double-digit growth. Almost every mobile phone and digital camera contains at least one stacked die CSP. While much of the volume has been in the two-die stacked package, an increasing number of stacked die packages with three, four or five die are shipping. In addition, Fujitsu Micro-

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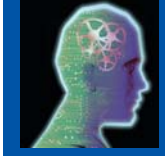

electronics, ChipPAC and Intel are offering eight die stacked CSPs—some with interposers between the die (Figure 1).

The inclusion of logic and other components makes this a year to watch system-in-package (SiP) and system-on-chip (SOC) developments. While IC designers continue to integrate functions into a single die, economics at the wafer fab level and business decisions often drive the need for SiP. While industry analysts have no consensus on a clear definition for SiP, they all agree that this segment will see lots of action.

With legislative deadlines looming in Europe, lead-free assembly is becoming an issue for many U.S. companies. Some Japanese companies are already shipping up to 25% of components with lead-free finishes. Memory makers may offer new packages with only lead-free finishes. Many consumer electronics, mobile phone and laptop computer makers offer products with lead-free solder. Greater interest in recycling may emerge as an alternative solution in the lead-free dilemma.

Beyond 2004

While an upturn seems to be in progress, what the future holds is up to speculation. The U.S. economy typically sees a boost during an election year. While many economic indicators will show improvement, employment growth in the electronics manufacturing sector is expected to show smaller gains as jobs continue to move offshore. Protectionist actions in the U.S. and other countries and their impact on international trade are of great concern. Higher interest rates driven by excessive deficits will dampen future growth. Regardless of future economic scenarios, 2004 promises brighter prospects than recent years, and the electronics industry should benefit. ■

References

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